AMENDMENTS TO THE CLAIMS

The following listing of claims,in which text to be added is underlined and text to be deleted is stricken through, will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (previously presented) A method of altering the refractive index of a region of a crystal comprising focusing a pulsed laser beam at a desired position within the crystal and moving the focused beam along a path such that the focused beam lowers the average refractive index of the region of the crystal along the path.

2. (cancelled)

3. (previously presented) A method according to claim 1 in which the altered region of the crystal comprises a waveguide.

4. (previously presented) A method according to claim 1 comprising the steps of moving the focused beam along multiple paths to create a diffraction grating within the crystal.

5. (previously presented) A method according to claim 1 comprising the steps of moving the focused beam to create a selective reflector within the crystal.

6. (previously presented) A method according to claim 1 in which at least part of the region of altered refractive index is created remote from the surfaces of the crystal.

7. (Currently amended) A method according to claim 6 wherein the region is created at variable depth from the surfaces of the crystal and ~~preferably~~ forms a three dimensional light guiding structure within the crystal.

8. (previously presented) A method according to claim 1 in which the effective refractive index of the region is altered by a predetermined amount.

9. (previously presented) A method according to claim 8 in which the intensity of the light beam is modulated whilst the focused beam is moved modulating the predetermined change to the refractive index which is proportional to the intensity.

10. (previously presented) A method according to claim 1 in which no laser-induced breakdown of the crystal in the path has occurred.

11. (cancelled)

12. (Currently amended) A method according to claim ~~11~~ 1 ~~in which~~ wherein the crystal is a laser crystal and the laser crystal is selected from the group consisting of YAG, Forsteryte, Vanadate, LiSAF, GSGG or Sapphire.

13. (Currently amended) A method of altering the refractive index of a region

of a crystal comprising the steps of focusing a pulse laser beam at a desired position within the crystal and moving the focus beam along a path such that the focus beam ~~alters~~ lowers the refractive index of the region of the crystal <u>along the path</u> wherein the crystal on which the laser is focused is a laser crystal suitable for use in producing a laser and in which the laser crystal is doped with a metal.

14. (previously presented) A method according to claim 13 in which the laser crystal is chromium doped, Titanium doped, Tm, Er, Yb or neodymium doped.

15. (previously presented) A method according to claim 14 in which the laser crystal has additional co-doping.

16. (Currently amended) A method according to claim ~~11~~ <u>1</u> ~~in which~~ <u>wherein the crystal is a laser crystal and</u> the laser crystal contains a number of point defects.

17. (previously presented) A method according to claim 13 in which multiple regions of altered refractive index are created at multiple different depths within the crystal.

18. (previously presented) A method according to claim 13 wherein the light beam used is a pulsed laser.

19. (previously presented) A method according to claim 18 wherein the pulsed laser is a femtosecond laser with a pulse duration of below 200 fs.

20. (previously presented) A method according to claim 18 wherein the laser is operated at wavelength of between 1.35 μm and 1.57 μm.

21. (previously presented) A method according to claim 18 wherein the laser has a pulse frequency of between 0.5 And 1.5 kHz.

22. (previously presented) A method according to claim 18 wherein the laser has a pulse energy of around 0.5mJ.

23. (previously presented) A method according to claim 1 in which the beam is focused by a microscope objective.

24. (previously presented) A method according to claim 1 in which the focused beam is moved periodically along the path.

25. (previously presented) A laser cavity at least part of which is made by the method of claim 1.

26. (previously presented) A crystal comprising an inscribed optical structure wherein the structure has a lower refractive index to the rest of the crystal.

27. (Cancelled)

28. (previously presented) A device comprising a laser crystal including the crystal of claim 26.

29. (previously presented) A crystal according to claim 26 in which the crystal is YAG, Forsteryte, Vanadate, LiSAF, GSGG or Sapphire.

30. (Currently amended) A crystal comprising an inscribed optical structure wherein the structure ~~is a different~~ has on average a lower refractive index to the rest of the crystal and wherein the crystal is doped with a metal according to claim 26 in which crystal is doped with a metal.

31. (previously presented) A crystal according to claim 30 in which the crystal has additional doping with Magnesium or Calcium.

32. (previously presented) A crystal according to claim 26 wherein at least part of the optical structure is remote from the surfaces of the crystal.

33. (previously presented) A crystal according to claim 32 wherein at least part of the optical structure is at a depth of over 10 μm from the surface of the crystal.

34. (previously presented) A crystal according to claim 26 wherein the optical structure is surrounded on all sides by non-inscribed crystal of uniform refractive index and forming part of the same lattice.

35. (Currently amended) A crystal according to claim 26 ~~to 34~~ wherein the optical structure is three dimensional and has a variable depth with respect to surfaces of the crystal.

36. (previously presented) A crystal according to claim 26 wherein the optical structure comprises a waveguide.

37. (previously presented) A crystal according to claim 36 wherein the optical structure comprises a mulitcore waveguide having a plurality of coupled single waveguides.

38. (previously presented) A crystal according to claim 37 wherein the multicore waveguide is capable of operating as carrier of a common supermode.

39. (previously presented) A crystal according to claim 37 wherein the plurality of coupled single waveguides are each separated by less than 5 μm.

40. (previously presented) A crystal according to claim 26 wherein the optical structure comprises a diffraction grating.

41. (previously presented) A crystal according to claim 26 wherein the optical structure comprises a selective reflector.

42. (previously presented) A crystal according to claim 26 wherein the optical structure comprises an optical coupler.

43. (Cancelled)

44. (previously presented) A crystal according to claim 26 wherein the material of the optical structure is part of the crystal and has not broken down.

45. (previously presented) A crystal according to claim 26 wherein the optical structures comprises a plurality of tunnel regions which passing above or on the side of each other inside the crystal.

46. (previously presented) A crystal according to claim 26 having an increased

quantity of defects throughout the crystal.

47. (Currently amended) A crystal according to claim 46 wherein the defects comprise one or more of point defect ~~such as vacancies~~, interstitial defects and substitutional impurity defects.

48. (previously presented) A crystal according to claim 46 wherein the defects comprise dislocations.

49. (previously presented) A crystal according to claim 48 wherein concentration of point defects is in the range 10^{18} - 10^{21} cm^{-3}.

50. (previously presented) A crystal according to claim 48 wherein concentration of dislocations is in the range 10^{7} - 10^{11} cm^{-2}.

51. (previously presented) A method of producing a multicore waveguide, comprising a plurality of coupled single waveguides, in a material, comprising the steps of,

focusing a pulsed laser beam at a desired position within the material and moving the focused beam along a path such that the focused beam lowers the average refractive index of the region of the material along the path,

and refocusing a pulsed laser beam at a second desired position within the

material and moving the focused beam along a second path separated from the first path such that the focused beam alters the refractive index of the region of the material along the second path.

52. (previously presented) A method according to claim 51 in which the first and second paths are separated by a substantially constant distance.

53. (previously presented) A method according to claim 51 wherein the multicore waveguide is capable of operating as carrier of a common supermode.

54. (previously presented) A method according to claim 51 wherein the plurality of coupled single waveguides are each separated by less than 5 μm.

55. (previously presented) A method according to claim 51 wherein the step of refocusing and creating an additional altered region along an additional path is repeated 10 times to produce a multicore waveguide comprising 10 coupled single waveguides.

56. (previously presented) A method according to claim 51 wherein the material comprises a crystal.

57. (Cancelled)

58. (previously presented) A method of fabricating an optical structure in an active crystal comprising the steps of focusing a pulsed laser beam at a desired position within the crystal and moving the focused beam along a path such that the focused beam lowers the refractive index of the region of the crystal along the path.

59. (previously presented) A method according to claim 58 wherein the refractive index of the region is increased in part and decreased in other parts.

60. (Currently amended) A laser formed by an effective waveguide having a cladding of depressed refraction index where the core of unmodified material is surrounded at least in part, by a number of tracks comprising material modified <u>by a laser</u> in a way to mainly lower the refractive index.

61. (previously presented) A laser according to claim 60, the laser having feedback elements.

62. (Cancelled)

63. (Currently amended) A method according to claim 6 when the distance is more than 10 μm<u>.</u>

64. (previously presented) A method according to claim 8 wherein the point defects are vacancy defects.

65. (previously presented) A method according to claim 19 wherein the pulse duration is around 120 fs.

66. (previously presented) A method according to claim 20 wherein the wavelength is 1.5 μm.

67. (previously presented) A method according to claim 20 wherein the wavelength is chosen to minimise linear absorption by the crystal.

68. (previously presented) A method according to claim 23 wherein the numerical aperture is in the range of 0.2 to 0.65.

69. (Currently amended) A crystal according to claim 30 wherein the metal with which the crystal is doped is chromium, titanium Tm, Er, Yb or neodymium.

70. (previously presented) A crystal according to claim 33 wherein the structure is a depth of over 100 μm.

71. (previously presented) A crystal according to claim 39 wherein the waveguides are separated by around 3.5 μm.

72. (previously presented) A method according to claim 54 wherein the waveguides are separated by around 3.5 μm.